REMARKS

Claims 24, 29-30 and 33 are pending in the present application. Claims 24, 29 and 33 are sought to be amended without prejudice thereto or disclaimer thereof any omitted subject matter. Support for the amendments to the claims or specification can be found in the original claims and throughout the specification. These changes are not believed to introduce new matter and their entry is respectfully requested.

I. Objections to the Specification

The Examiner has objected to the specification because of embedded hyperlinks and the use of trademarks without capitalization. Office Action, pages 2-3. It is believed that with the present amendments that these objections have been overcome. Applicants respectfully request that the Examiner reconsider and withdraw these objections.

II. Claim Objections

Claims 24 and 29 are objected to for not presenting the full wording for SDS-PAGE. Office Action, page 3. It is believed that with the present amendments the basis for this objection is overcome. Applicants respectfully request that the Examiner reconsider and withdraw these objections.

III. Rejections Under 35 U.S.C. § 112

A. Written Description Rejections

Claims 24, 29 and 33 stand rejected under 35 U.S.C. § 112, first paragraph, for allegedly not providing adequate written description. Office Action, pages 3-6.

Applicants respectfully traverse the rejection of claim 29 for the use of the term "an" to introduce the isolated and purified immunogenic lipoprotein of 61 kD as measured by SDS-PAGE. However, solely to expedite prosecution and not in acquiescence to the rejection, Applicants have amended this claim changing "an" to "the".

It is respectfully submitted that with the present amendments, these rejections are now overcome. Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw these rejections.

B. Enablement Rejections

Claim 24 stands rejected under 35 U.S.C. § 112, first paragraph, for lack of enablement. Office Action, pages 6-8. With the present amendments it is believed that this rejection of claim 24 is now overcome. Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw these rejections.

C. Indefiniteness Rejections

Claims 24 and 33 stand rejected under 35 U.S.C. § 112, second paragraph, for being indefinite. Office Action, page 8. Claim 24 is objected to for the phrase "detecting *Brachyspira hyodysenteriae* antibodies." With the present amendments to claim 24 reciting a diagnostic kit for detecting antibodies to *Brachyspira hyodysenteriae* it is believed this rejection is overcome. Claim 33 is alleged to be indefinite for using the phrase "immunogenically effective amount." With the present amendments to claim 33, it is believed that this objection is overcome as well. Applicants respectfully request that the Examiner reconsider and withdraw these rejections.

IV. Rejections Under 35 U.S.C. §102(b) and/or §103(a)

A. Thomas et al., Infect. Immun. 60:3111-3116 (1992) ("Thomas et al.")

Claims 24, 29, 30 and 33 stand rejected under 35 U.S.C. §102(b) or under 35 U.S.C. §103(a) over Thomas *et al.* Office Action, pages 9-10. Thomas *et al.* is relied on for allegedly disclosing a 60 kD protein isolated from the detergent phase extraction of *Brachyspira hyodysenteriae* cell membranes. The rejections for anticipation or obviousness over Thomas *et al.* is respectfully traversed.

Applicants point out that Thomas *et al.* fails to disclose the isolated lipoprotein according to the present invention.

The Examiner argues that the protein as currently claimed is disclosed in figure 1 of Thomas *et al.* Apparently, the Examiner is referring to the "58 kDa" band. The Examiner may also be mindful of the 60 kDa band in figure 3. With respect to figure 1, the Examiner states that "Thomas *et al.* disclose a 60 kD protein isolated from the detergent phase extraction of *Brachyspira hyodysenteriae* cell membranes." Office Action, page 9, emphasis added, citation omitted. The Examiner also apparently relies on the fact that the band at 58 kDa represents only one ("a," "isolated") protein.

These allegations are incorrect for several reasons. First, as is commonly known, with Triton X-114, not only cell membrane proteins are extracted, but also cytoplasmic lipoproteins. *See* page 1495, last line to page 1496, line 3 of Exhibit A, "Spirochaetel Lipoproteins and pathogenesis," Haake D. A., *Microbiology 146:*1491-1504 (2000). Moreover, the Examiner's allegations are dubious given the facts that Triton X-114 extracts many membrane proteins, and not only lipoproteins into the hydrophobic phase. *See* Exhibit A, page 1495, first column, last paragraph: "Membrane proteins, *including* lipoproteins, typically partition selectively into the Triton X-114 hydrophobic phase" (emphasis added). Hence, the implication that Triton X-114 extracts include membrane proteins *other than* lipoproteins is clear. Moreover, spirochetes are well known for their very rich presence of membrane lipoproteins (see Exhibit A, page 1491, first column, lines 3-7). Thus, the Examiner's arguments are based on wrong interpretations of the teaching of Thomas *et al.*, as Applicants believe that the bands comprise mixtures of lipoproteins.

With respect to figure 3, The Examiner states that the 60 kDa protein "was also found to incorporate a radioactive fatty acid label, showing the lipid nature of the protein." Office Action, page 10, citation omitted. Apparently, the Examiner is of the opinion that since a *Brachyspira hyodysenteriae* lipid protein of around 60 kDa pops up in the [3H]palmitic acid labeling test, the band visualized must thus represent an isolated lipoprotein. This allegation is not correct.

Applicants point out that only the proteins at around 60 kDa that actually take up the tritiated label in the radioactive palmitic acid are visualized in lane 3. Other proteins at around 60 kDa are also present, but are not visible in the band. Figure 1 (lanes 3 to 10) demonstrates that this region is crowded with compounds. These compounds are also present in the 60 kDa band of figure 3, lane 3. Thus, it is clear that this band provides the skilled practitioner merely with a mixture of many proteins and not the isolated and claimed lipoprotein.

In short, Thomas does not provide the skilled practitioner with the isolated 60 kDa protein, and thus, the diagnostic kit and immunogenic composition comprising this protein are neither anticipated or rendered obvious by the teachings of Thomas *et al.*

At most, Thomas et al. describes a mixture of substances, which mixtures include the currently claimed protein. (Applicants caution, however, that Thomas *et al.* does not explicitly teach the presence of the claimed protein.) But such a mixture would not provide the skilled artisan with the claimed isolated lipoprotein. Moreover, Thomas focuses completely on the 16 kDa lipoprotein, and even more importantly identifies only this protein (see "Discussion") as a protein that "may have some value as a component in the control of swine dysentery by vaccination" (page 3115, right column, last three lines). Therefore, even *if arguendo* one would presume that the band "around 60 kDa" discussed by Thomas *et al.* is the currently claimed 61 kDa protein, there is no incentive for the skilled artisan to use that protein in a diagnostic kit for detecting swine dysentery or immunogenic composition pertaining to treatment of this disease.

Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw these rejections.

B. Chatfield et al., Infect. Immun. 56:1070-1075(1988) ("Chatfield et al.")

Claims 24, 29-30 and 33 are rejected under 35 U.S.C. §102(b) for allegedly being anticipated by Chatfield *et al.* Office Action, page 10. Alternatively, claims 24, 29-30 and 33 are rejected under 35 U.S.C. §103(a) for allegedly being obvious over Chatfield *et al. Id.* Applicants respectfully traverse these rejections.

The Examiner alleges that Chatfield discloses the isolated 61 kDa lipoprotein according to the present invention. In support of this allegation, the Examiner refers to figures 5 and 6. Indeed, **around** the 66 kDa marker protein one can see a band. However, Chatfield himself indicated that this band is approximately 68,000 Da (see page 1073, column 2, towards top). Therefore this band, even if it would represent an isolated lipoprotein, cannot anticipate the presently claimed 61 kDa protein.

Furthermore, the diagnostic kit and immunogenic composition comprising this protein can also not be regarded as anticipated or rendered obvious by Chatfield *et al.* Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw these rejections.

C. Wannemuehler et al., Infect. Immun. 56:3032-3039 (1988) ("Wannemuehler et al.)

Claims 24, 29-30 and 33 are rejected under 35 U.S.C. §102(b) for allegedly being anticipated by Wannemuehler *et al.* Office Action, page 11. Alternatively, claims 24, 29-30 and 33 are rejected under 35 U.S.C. §103(a) for allegedly being obvious over Wannemuehler *et al. Id.* Applicants respectfully traverse these rejections.

The Examiner states that Wannemuehler *et al.* discloses the 61 kDa protein according to the present invention and that it would have been obvious to package this protein in a kit for ease of use. The Examiner relies on figure 1 as the basis of the allegation that the protein according to SEQ ID NO: 2 is anticipated or rendered obvious by Wannemuehler *et al.* This figure, however, shows Triton X-100 extracts. As discussed above with reference to Exhibit A, Extraction with the commonly known detergent Triton X-100 is not a specific method for extracting lipoproteins. Thus, the vague bands which appear around the 66 kDa marker protein most probably represent a mixture of all kinds of proteins. Therefore, it is highly speculative to state that the isolated 61 kDa protein of the present invention is anticipated by Wannemuehler *et al.*

Furthermore, with regard to the use of outer membrane proteins as immunogenic compounds related to swine dysentery, Wannemuehler *et al.* leaves no doubt about the region of

interest: the 14-19 kDa region. As can be seen in figure 5, lanes M to Q (sera collected on day 35) one can see that the region around 14-19 kDa is the region that shows a clear difference between infected and control swines. This is recognized also by Wannemuehler *et al.* See page 3037, second column, last two sentences spanning pages 3037-3038. This is confirmed throughout the rest of Wannemuehler *et al.*'s "Discussion" paragraph. Thus, Wannemuehler *et al.* clearly teaches away from using proteins in the 66 kDa region in a diagnostic kit or immunogenic composition pertaining to swine dysentery.

Hence, Applicants' claims can not be regarded as anticipated or rendered obvious by Wannemuehler *et al.* Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw these rejections.

D. Joens et al., Infect. Immun. 54:893-896 (1986)("Joens et al.")

Claims 24, 29-30 and 33 are rejected under 35 U.S.C. §102(b) for allegedly being anticipated by Joens *et al.* Office Action, pages 11-12. Alternatively, claims 24, 29-30 and 33 are rejected under 35 U.S.C. §103(a) for allegedly being obvious over Joens *et al. Id.* Applicants respectfully traverse these rejections.

Applicants respectfully assert that Joens *et al.* fails to anticipate the claimed invention because it does not explicitly recite the claimed isolated protein.

Moreover, Joens *et al.* unambiguously teaches away from the use of this protein in a vaccine. Joens does not mention the possible use of any of the 26 proteins in a vaccines, except for a 16 kD protein. The 16 kD proteins is for Joens the protein of choice for two reasons: 1) at page 896, Joens says in the second full paragraph: "Because of this finding and the fact that the 16-kDa antigen was identified only with sera from pigs which had recovered from the disease, it is possible that this antigen is responsible for protecting pigs against SD." 2) Joens says in the third full paragraph: "The 16-kDa antigen is the same antigen which was prominent in blots from convalescent antisera. This further confirms that this antigen is involved in the immune response of pigs to SD."

Joens *et al.*'s conclusion is clear: It is the 16-kDa antigen that is involved in the protection of pigs to SD. This clearly teaches away from the use in a vaccine of any of the other 25 antigens including the 59 kD protein. And thus it teaches away form the use of the 61 kD antigen according to the invention in a vaccine.

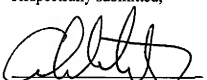
Hence, Applicants' claims can not be regarded as anticipated or rendered obvious by Joens *et al.* Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw these rejections.

CONCLUSION

Applicants do not believe that any other fee is due in connection with this filing. If, however, Applicants do owe any such fee(s), the Commissioner is hereby authorized to charge the fee(s) to Deposit Account No. **02-2334**. In addition, if there is ever any other fee deficiency or overpayment under 37 C.F.R. §1.16 or 1.17 in connection with this patent application, the Commissioner is hereby authorized to charge such deficiency or overpayment to Deposit Account No. **02-2334**.

Applicants submit that this application is in condition for allowance, and request that it be allowed. The Examiner is requested to call the Undersigned if any issues arise that can be addressed over the phone to expedite examination of this application.

Respectfully submitted,



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